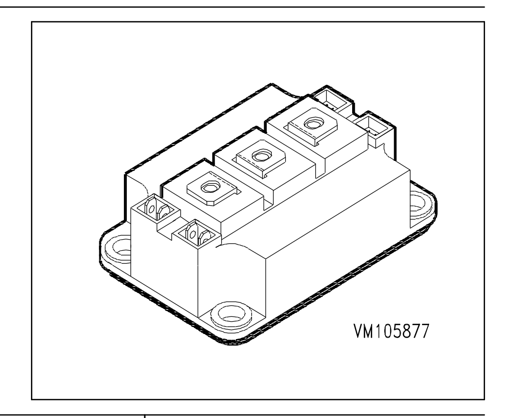


IGBT Power Module



- Half-bridge
- Including fast free-wheeling diodes
- Package with insulated metal base plate

Type	V_{CE}	I_C	Package	Ordering Code
BSM 200 GB 120 DN2	1200V	290A	HALF-BRIDGE 2	C67070-A2300-A70

Maximum Ratings

Parameter	Symbol	Values	Unit
Collector-emitter voltage	V_{CE}	1200	V
Collector-gate voltage R_{GE} = 20 kΩ	V_{CGR}	 1200	
Gate-emitter voltage	V_{GE}	± 20	
DC collector current T_C = 25 °C T_C = 80 °C	I_C	 290 200	A
Pulsed collector current, t_p = 1 ms T_C = 25 °C T_C = 80 °C	I_{Cpuls}	 580 400	
Power dissipation per IGBT T_C = 25 °C	P_{tot}	 1400	W
Chip temperature	T_j	+ 150	°C
Storage temperature	T_{stg}	-40 ... + 125	

Parameter	Symbol	Values	Unit
Thermal resistance, chip case	R_{thJC}	≤ 0.09	K/W
Diode thermal resistance, chip case	$R_{thJC\mathbf{D}}$	≤ 0.18	
Insulation test voltage, t = 1min.	V_{is}	2500	Vac
Creepage distance	-	20	mm
Clearance	-	11	
DIN humidity category, DIN 40 040	-	F	sec
IEC climatic category, DIN IEC 68-1	-	40 / 125 / 56	



Electrical Characteristics, at T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Static Characteristics					
Gate threshold voltage $V_{GE} = V_{CE}$, I_C = 8 mA	$V_{GE(th)}$	4.5	5.5	6.5	V
Collector-emitter saturation voltage V_{GE} = 15 V, I_C = 200 A, T_j = 25 °C V_{GE} = 15 V, I_C = 200 A, T_j = 125 °C	$V_{CE(sat)}$	- -	2.5 3.1	3 3.7	
Zero gate voltage collector current V_{CE} = 1200 V, V_{GE} = 0 V, T_j = 25 °C V_{CE} = 1200 V, V_{GE} = 0 V, T_j = 125 °C	I_{CES}	- -	3 12	4 -	mA
Gate-emitter leakage current V_{GE} = 20 V, V_{CE} = 0 V	I_{GES}	-	-	400	nA
AC Characteristics					
Transconductance V_{CE} = 20 V, I_C = 200 A	g_{fs}	108	-	-	S
Input capacitance V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz	C_{iss}	-	13	-	nF
Output capacitance V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz	C_{oss}	-	2	-	
Reverse transfer capacitance V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz	C_{rss}	-	1	-	



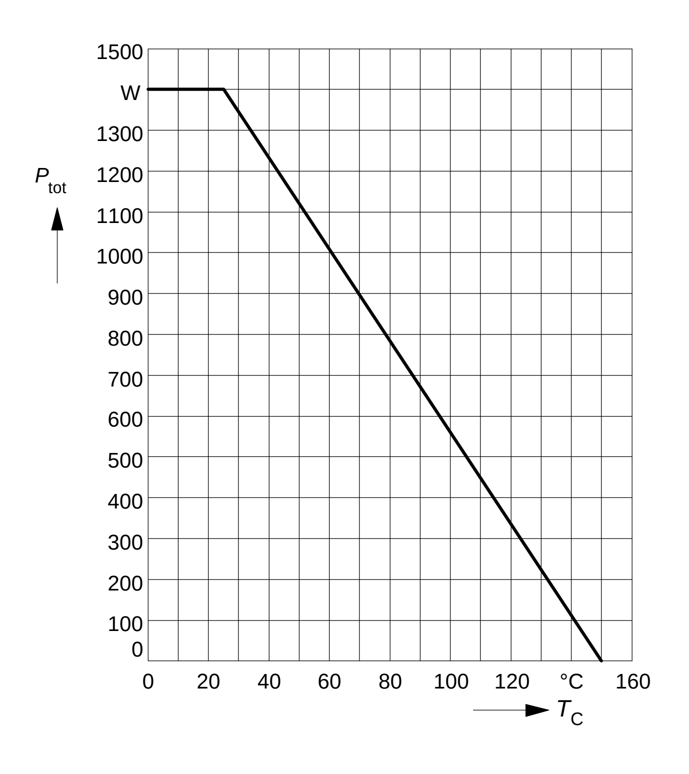
Electrical Characteristics, at T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	**typ.**	**max.**	
Switching Characteristics, Inductive Load at T_j = 125 °C					
Turn-on delay time V_{CC} = 600 V, V_{GE} = 15 V, I_C = 200 A R_{Gon} = 4.7 Ω	$t_{d(on)}$	-	110	220	ns
Rise time V_{CC} = 600 V, V_{GE} = 15 V, I_C = 200 A R_{Gon} = 4.7 Ω	t_r	-	80	160	
Turn-off delay time V_{CC} = 600 V, V_{GE} = -15 V, I_C = 200 A R_{Goff} = 4.7 Ω	$t_{d(off)}$	-	550	800	
Fall time V_{CC} = 600 V, V_{GE} = -15 V, I_C = 200 A R_{Goff} = 4.7 Ω	t_f	-	80	120	
Free-Wheel Diode					
Diode forward voltage	V_F				V
I_F = 200 A, V_{GE} = 0 V, T_j = 25 °C		-	2	2.5	
I_F = 200 A, V_{GE} = 0 V, T_j = 125 °C		-	1.8	-	
Reverse recovery time I_F = 200 A, V_R = -600 V, V_{GE} = 0 V di_F/dt = -2000 A/µs, T_j = 125 °C	t_{rr}	-	0.5	-	µs
Reverse recovery charge I_F = 200 A, V_R = -600 V, V_{GE} = 0 V di_F/dt = -2000 A/µs	Q_{rr}				µC
T_j = 25 °C		-	12	-	
T_j = 125 °C		-	36	-	



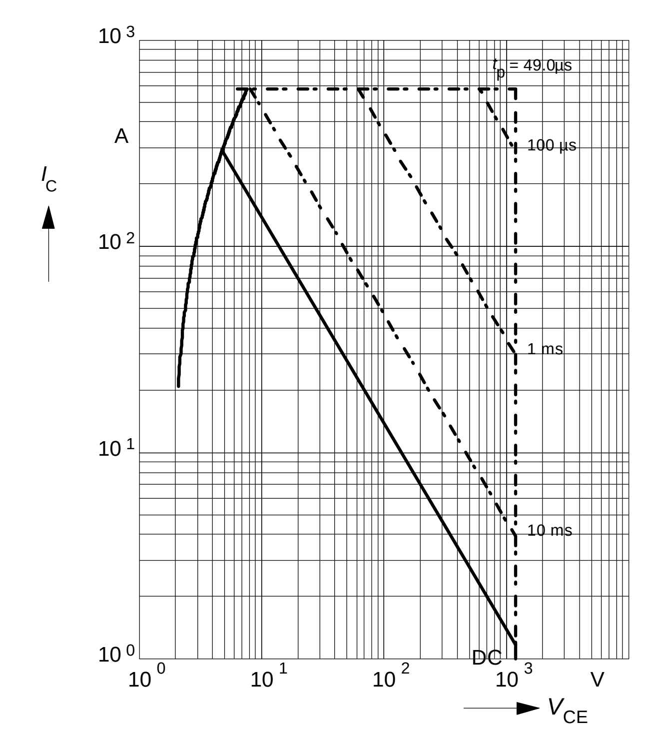
Power dissipation

$P_{tot} = f(T_C)$
parameter: $T_j \leq 150$ °C



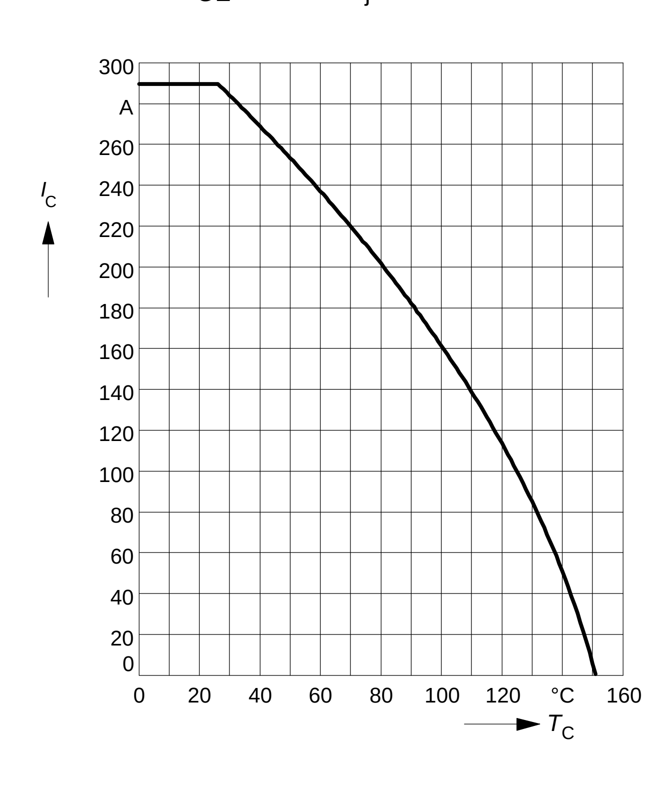
Safe operating area

$I_C = f(V_{CE})$
parameter: $D = 0$, $T_C = 25$°C , $T_j \leq 150$ °C



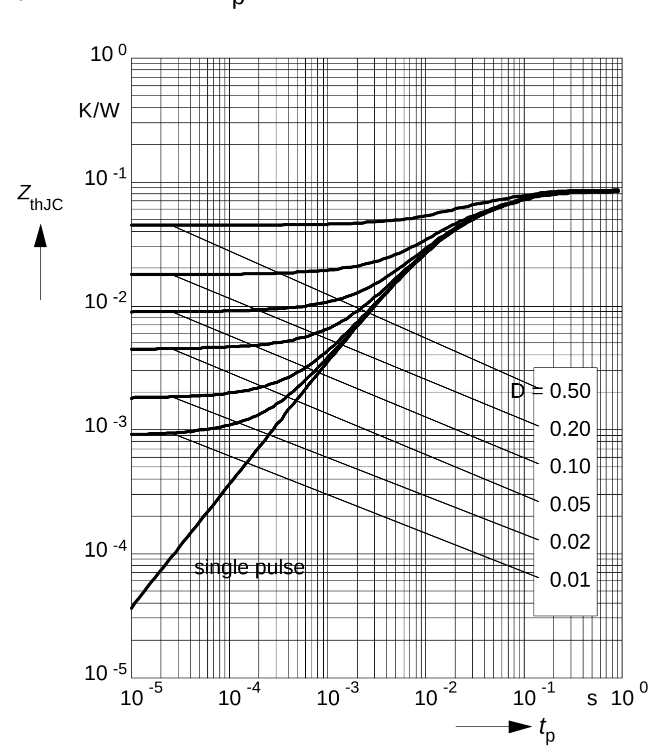
Collector current

$I_C = f(T_C)$
parameter: $V_{GE} \geq 15$ V , $T_j \leq 150$ °C



Transient thermal impedance IGBT

$Z_{th\,JC} = f(t_p)$
parameter: $D = t_p / T$

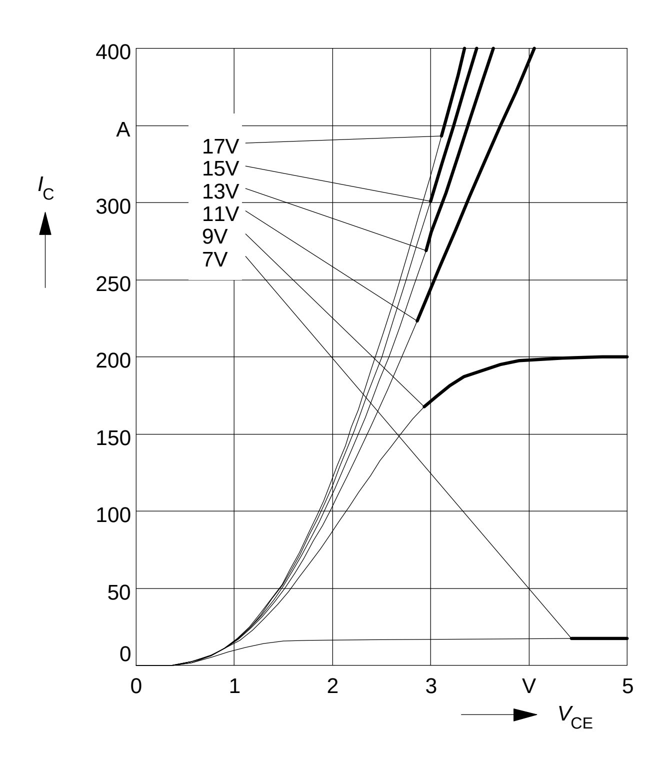




Typ. output characteristics

$I_C = f(V_{CE})$

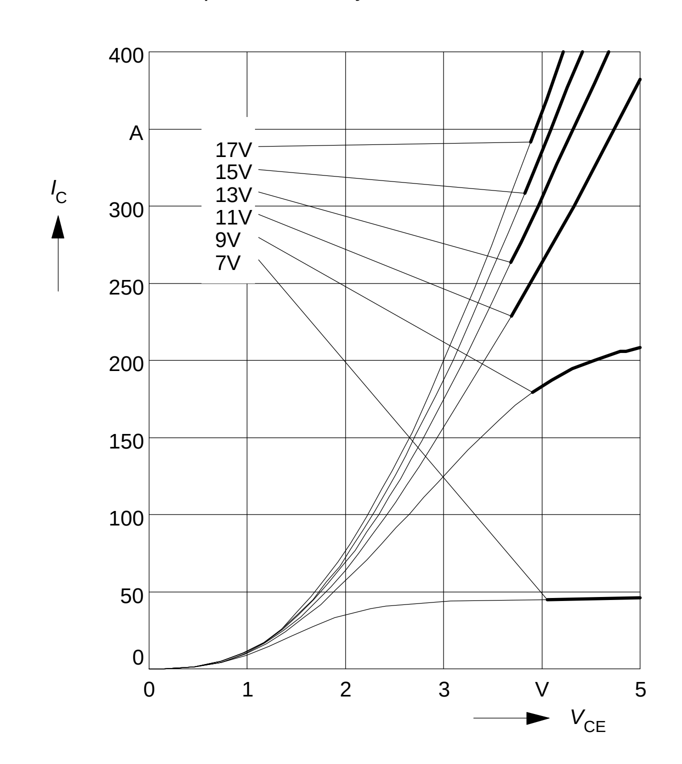
parameter: t_p = 80 µs, T_j = 25 °C



Typ. output characteristics

$I_C = f(V_{CE})$

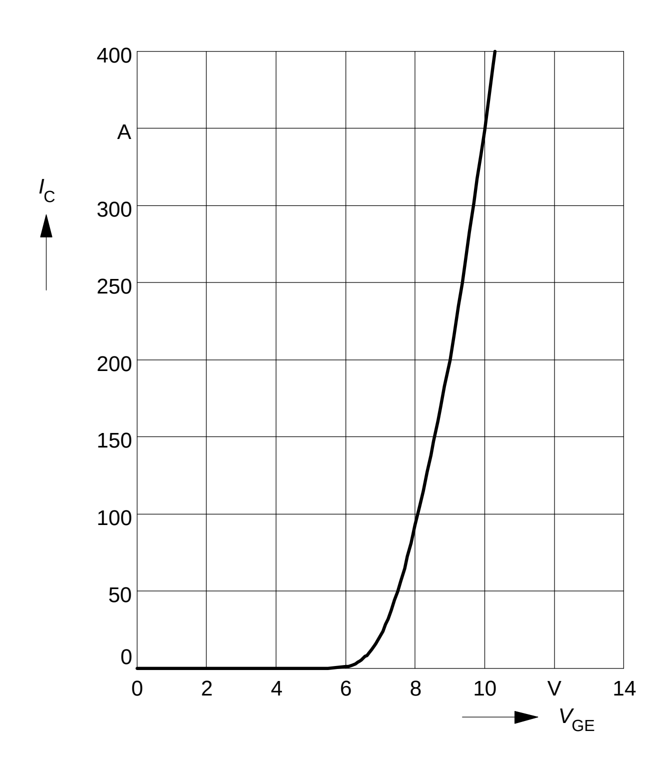
parameter: t_p = 80 µs, T_j = 125 °C



Typ. transfer characteristics

$I_C = f(V_{GE})$

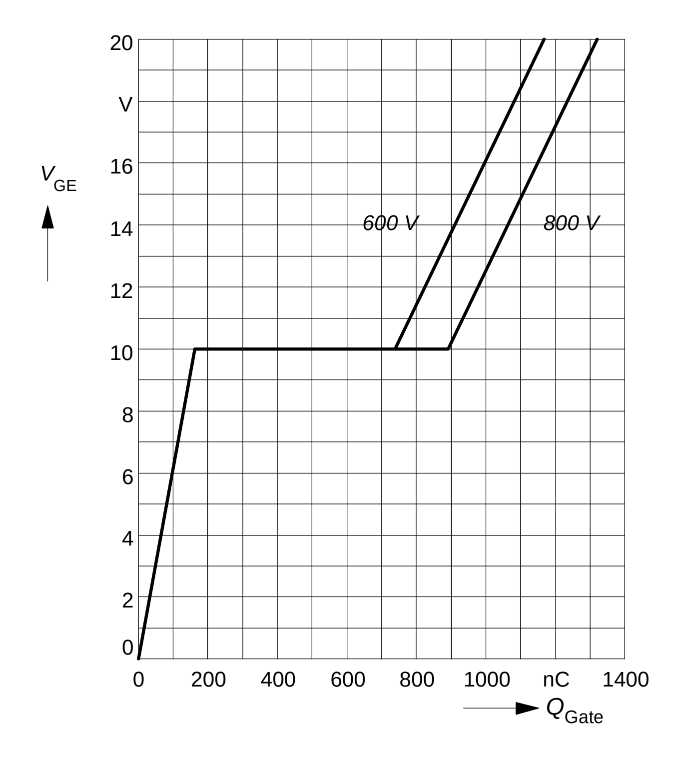
parameter: t_p = 80 µs, V_{CE} = 20 V





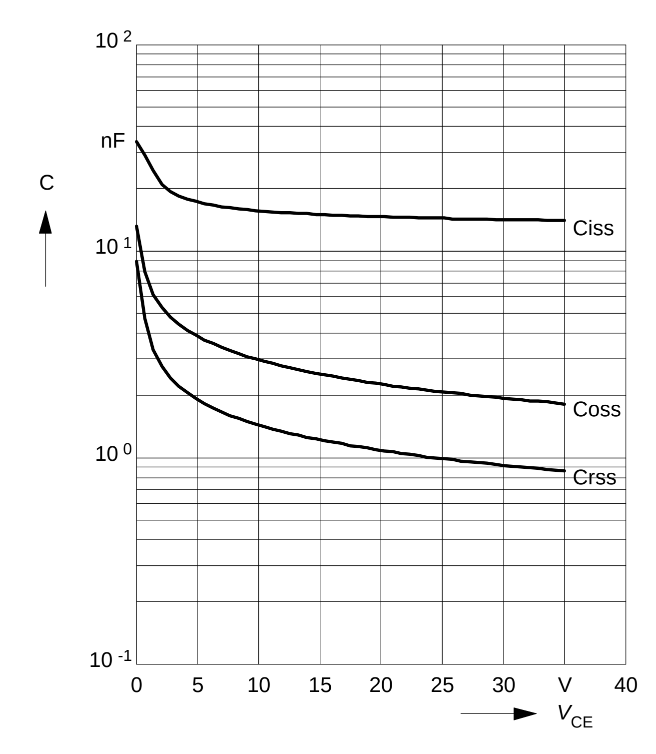
Typ. gate charge

$V_{GE} = f(Q_{Gate})$
parameter: $I_{C\ puls}$ = 200 A



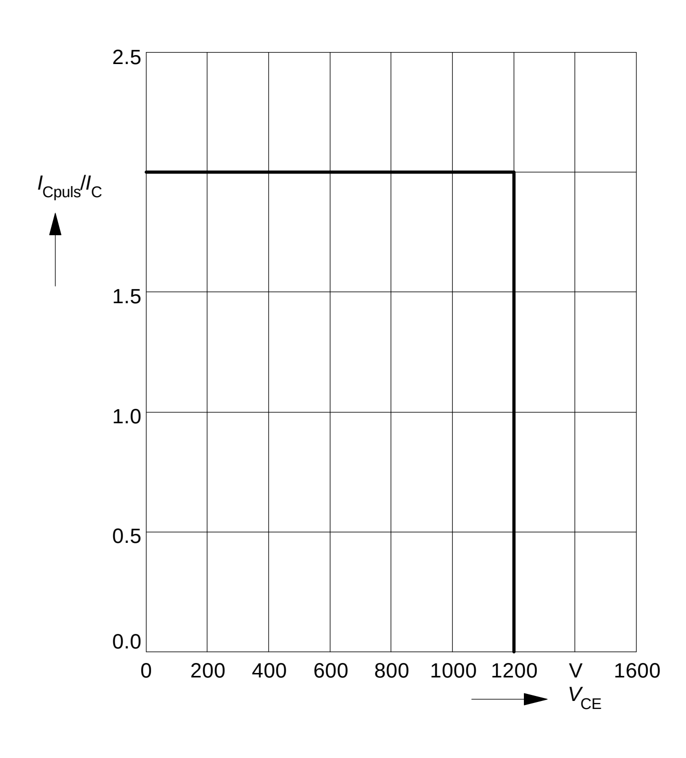
Typ. capacitances

$C = f\ (V_{CE})$
parameter: V_{GE} = 0 V, f = 1 MHz



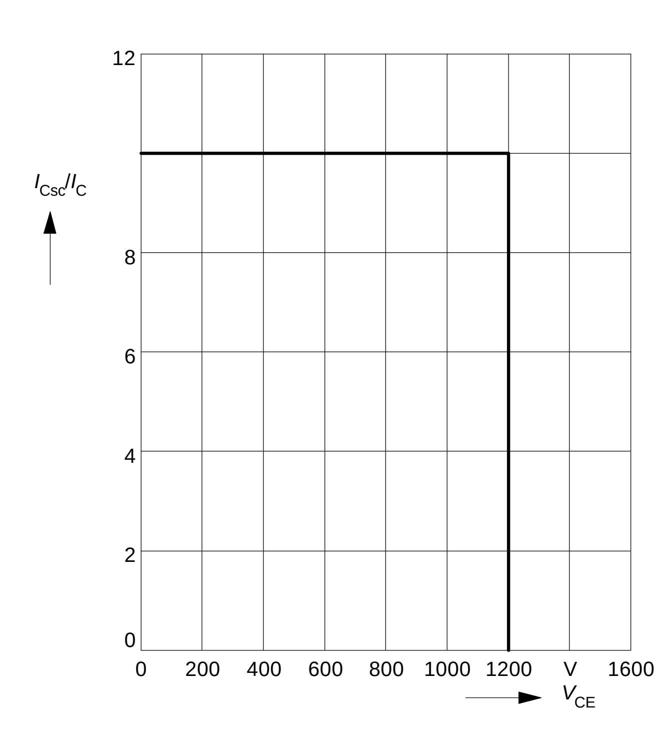
Reverse biased safe operating area

$I_{Cpuls} = f(V_{CE})$, T_j = 150°C
parameter: V_{GE} = 15 V



Short circuit safe operating area

$I_{Csc} = f(V_{CE})$, T_j = 150°C
parameter: V_{GE} = ± 15 V, t_{SC} ≤ 10 µs, L < 25 nH

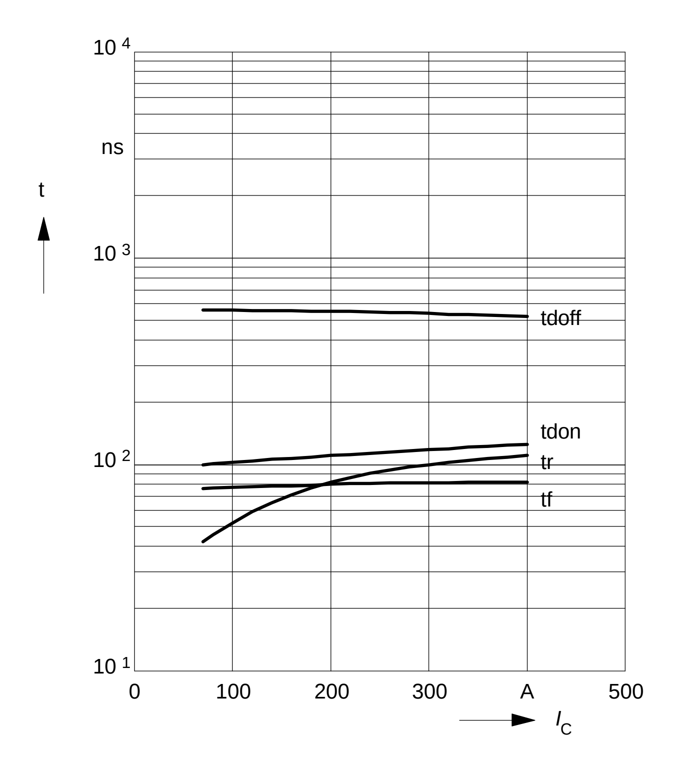




Typ. switching time

$I = f(I_C)$, inductive load , T_j = 125°C

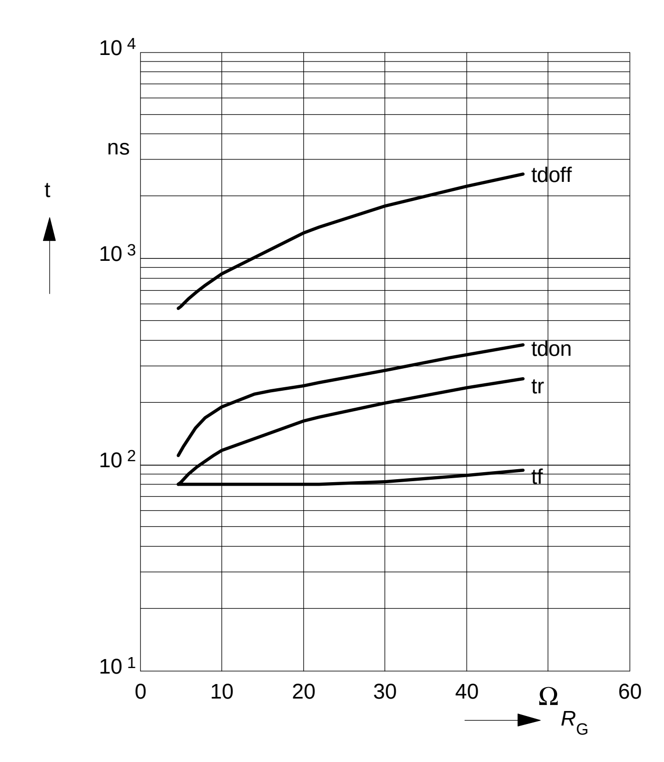
par.: V_{CE} = 600 V, V_{GE} = ± 15 V, R_G = 4.7 Ω



Typ. switching time

$t = f(R_G)$, inductive load , T_j = 125°C

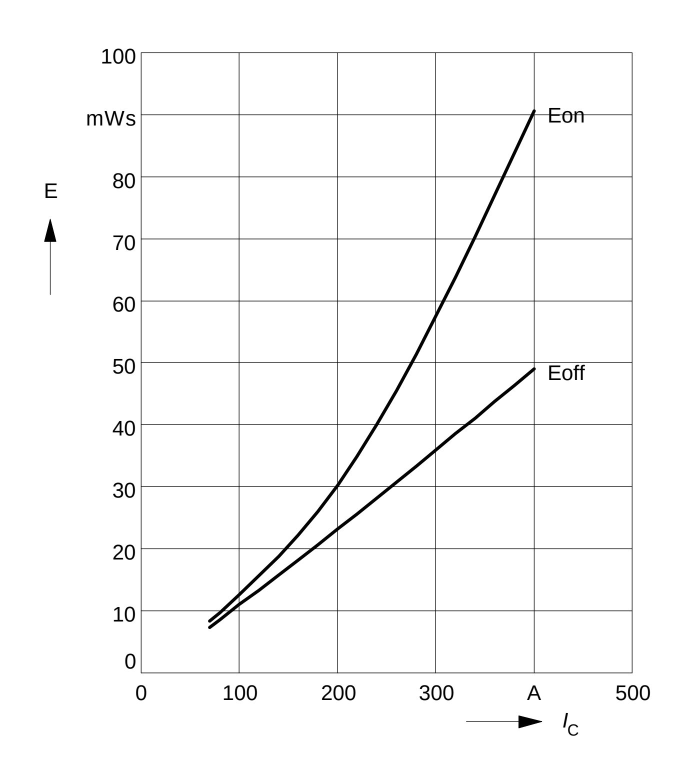
par.: V_{CE} = 600 V, V_{GE} = ± 15 V, I_C = 200 A



Typ. switching losses

$E = f(I_C)$, inductive load , T_j = 125°C

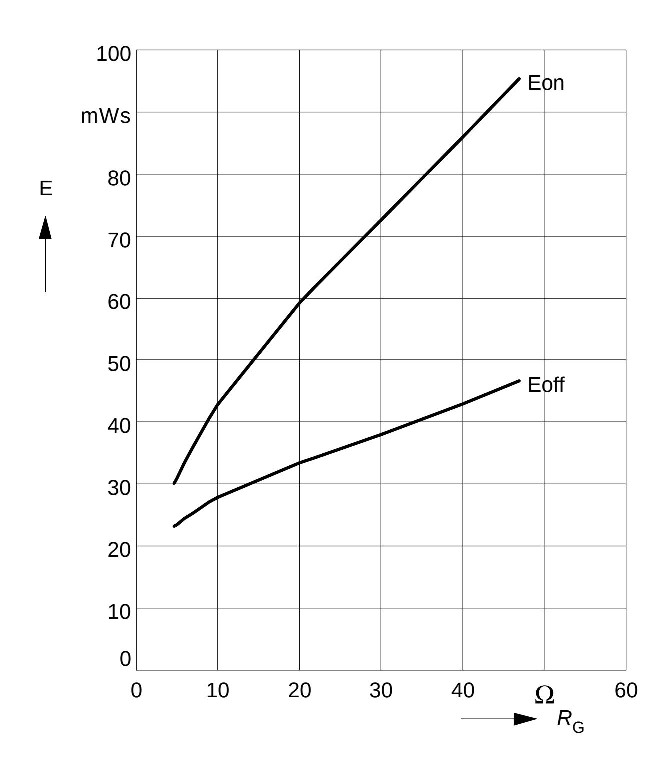
par.: V_{CE} = 600 V, V_{GE} = ± 15 V, R_G = 4.7 Ω



Typ. switching losses

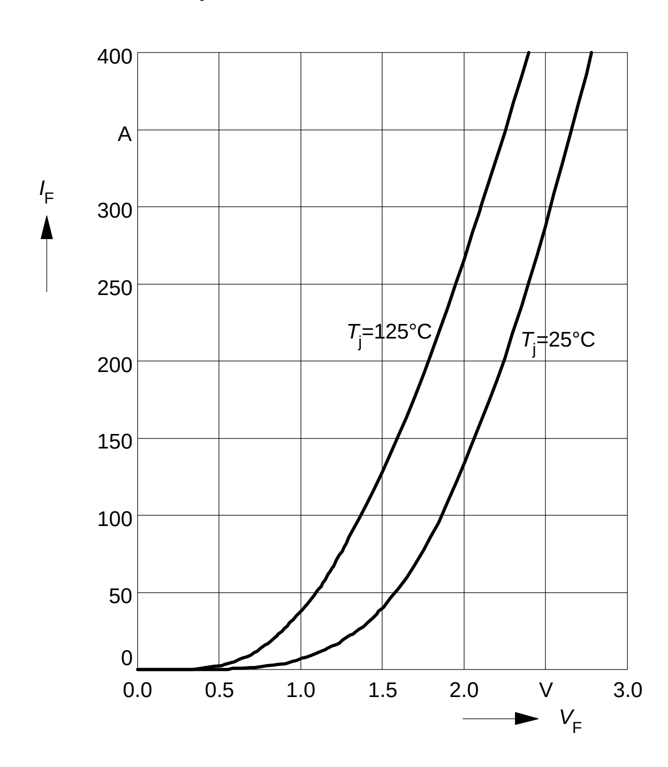
$E = f(R_G)$, inductive load , T_j = 125°C

par.: V_{CE} = 600V, V_{GE} = ± 15 V, I_C = 200 A

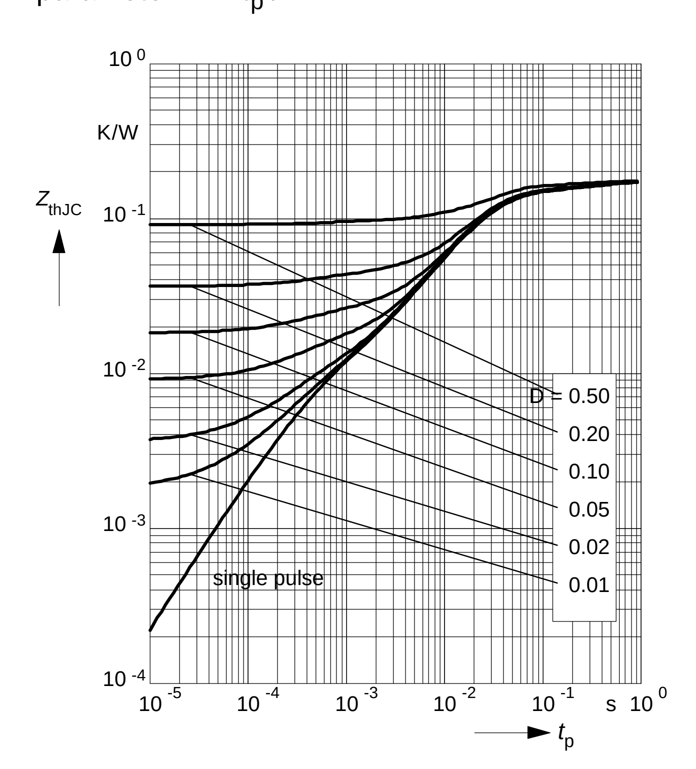




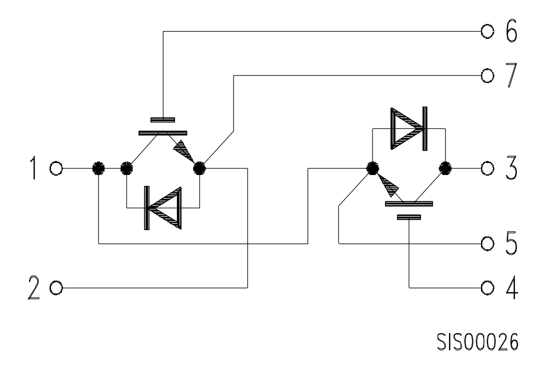
Forward characteristics of fast recovery reverse diode $I_F = f(V_F)$
parameter: T_j



Transient thermal impedance Diode
$Z_{th\ JC} = f(t_p)$
parameter: $D = t_p / T$



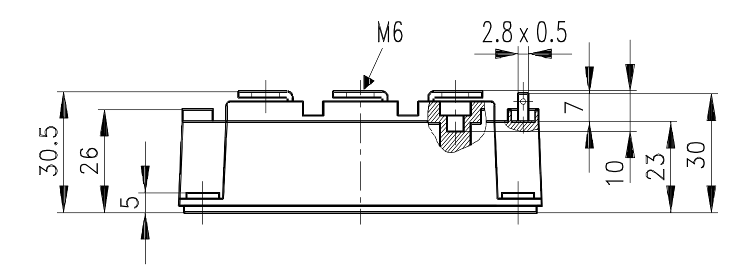
Circuit Diagram

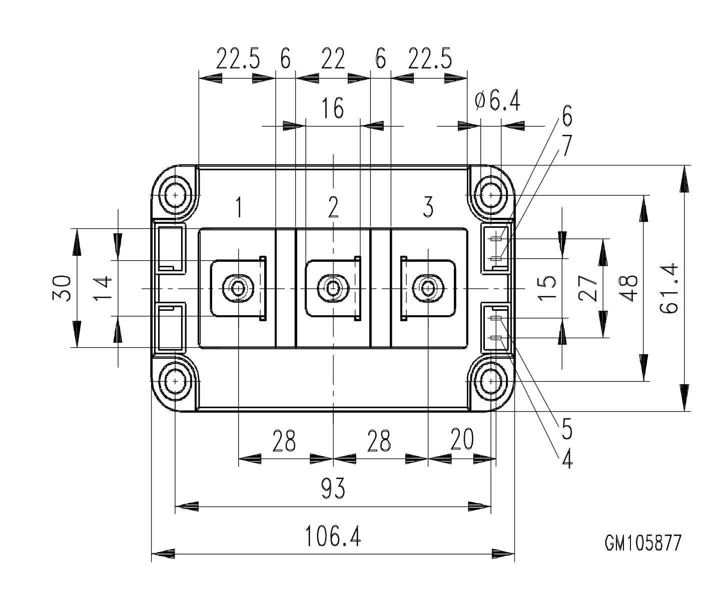


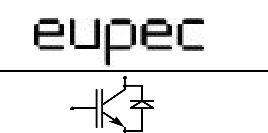
Package Outlines

Dimensions in mm

Weight: 420 g







Anhang C-Serie
Appendix C-series

Gehäuse spezifische Werte
Housing specific values

			typ.	
Modulinduktivität stray inductance module		L_{sCE}	20	nH

Gehäusemaße C-Serie
Package outline C-series

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